solplan review

the independent newsletter of energy efficient building practice

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Inside . . . . .

This month we investigate a situation that is going to have a great impact on the building industry but is not yet being dealt with buy the industry. CFCs are used in a range of building products and equipment. We have learned the products are harmful to the environment and we will have to stop using them as soon. We present a report on what these products are, where they are being used, and what moves are being made to reduce their use.

Quite often forced air heating (and ventilation) systems are installed with ductwork outside the heated building envelope. We report on a series of studies that measured just how large a penalty is paid for this kind of ducted system.

High-tech windows are appearing on the market. Some manufacturers are beginning to offer gas filled windows. We report what the benefits of these windows are.

The HRV industry has matured in the past few years. We present an overview of HRV products that are available today, and present an updated list of HRV performance ratings.

Other items include a comment on the status of energy standards in Canadian codes; the impact that the proposed new federal goods and services sales tax will have on the building industry (and how it compares to the existing manufacturer's sales tax); a comment on manufacturer's fan ratings; reports on new induced draft DHW heaters, and more.

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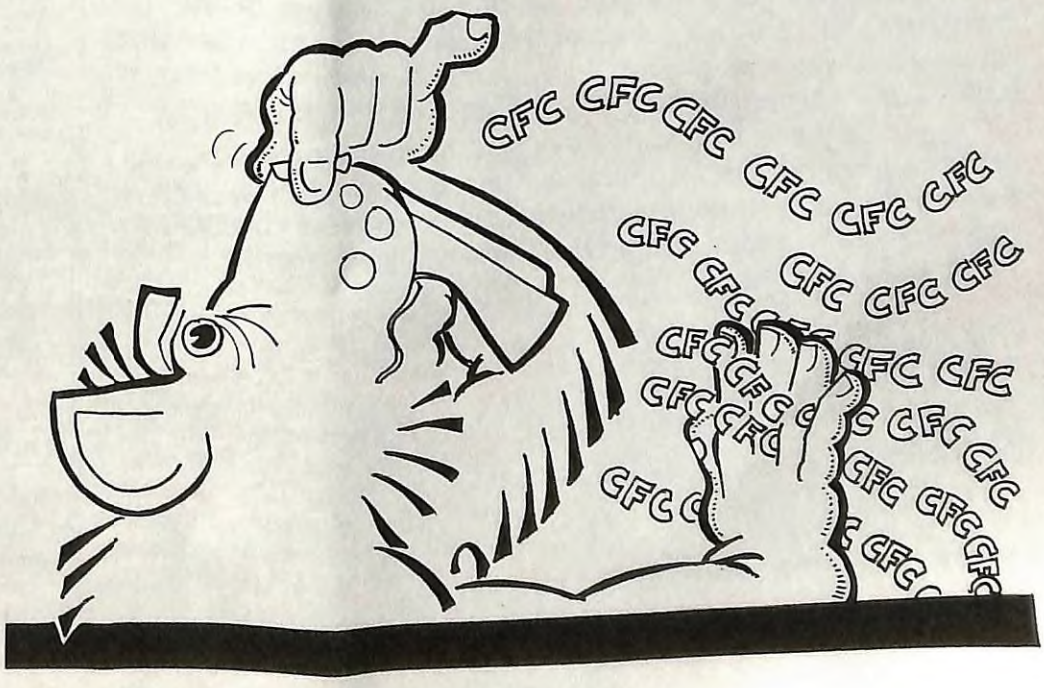
CFCs in Buildings



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Richard Kadulski

From the Publisher

Every day we hear more and more talk about the environment. Some may think that "these are the concerns of namby-pamby tree huggers and flower power kids; that it's about time to get serious and down to work. Besides, who wants to live in a cold house by candlelight? We can't afford to do away with the progress".

However, life is not that simple. Like it or not, we are all going to have to change our ways of working and doing business.

We are only beginning to learn the cost of our high standard of living. It may be more than we bargained for. Most obvious are the problems with the mountains of garbage we produce. Many areas are now running out of dumping grounds for the stuff; the more we continue to create it, the more difficult and expensive it's going to be deal with.

So how does this touch upon the building industry? Just look at the many new synthetic materials we use today. What we don't see is the crud that's generated by the processes used to make these wonderful products. (But then again, folks living on the Great Lakes understand what it means to catch deformed fish or have doubts about drinking lake water!)

We must remember that even the items we use in small quantities, such as the caulkings and sealants, all contribute to the problem. You may say that you don't use much of that stuff, so it's not going to be a problem. But remember: a single brick doesn't amount to much, but in large quantities it is something much greater. So too the pile of empties in the back of your garage - you only have a few beers every few days, but in a few weeks the pile is suddenly quite high.

We must come to terms with the fact that because of the environmental concerns, some of the materials we have become used to just won't be available any more, so we will have to look to new (or maybe old) ways of building. It will affect us all, so we might as well start investigating environmentally proper alternatives before they are forced on us. Who knows, we may find that some alternatives may actually be cheaper than some of the "new, improved" ways we have recently become hooked on!

R Kadulski

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Publisher

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CFC Use in Buildings

Richard Kadulski

We are hearing more and more warnings about the importance of keeping our environment healthy. We have learned about depletion of the ozone layer in the upper atmosphere brought on by the use of chlorofluorocarbons (CFCs). Is this something that the building industry should be concerned about?

CFCs are widely used in industry but they are a major source of damage to the ozone layer. The ozone layer is important to us as it is the thin layer which protects us against damaging ultra-violet light from the sun. Concern about this damage to the environment has led to a major international effort to develop acceptable substitutes to materials that will not harm the environment.

The first warnings about CFC action on the ozone layer were made over 15 years ago.

What are CFCs?

CFC compounds are thermally efficient, safe to use, and essential for most refrigeration and air conditioning applications that have been developed. They are also used in the manufacture of insulation, fire suppressants, and propellants for aerosols. They are stable and when released into the atmosphere, have a long lifetime.

CFCs migrate to the upper atmosphere where ultraviolet radiation from the sun decomposes them releasing chlorine; the chlorine in turn reacts with the ozone, thus reducing the concentration of ozone in the upper atmosphere.

CFC's are a family of compounds (with unspeakable names, such as *dichlorodifluoromethane*, also known as CFC 12). Some compounds are more damaging than others. The most damaging are CFC 11 and CFC 12, which can stay in the atmosphere for more than a century, and the halons, another group of chemicals used solely in fire extinguishers.

CFCs also act as greenhouse gases, which help accelerate global warming.

Why are they used?

Before it was recognized that CFCs have such a severe consequence on the environment, they were used in many applications because of the fundamental properties of these materials which include:

- All major CFCs are non-flammable;
- They have a low toxicity;
- The main CFCs are basic molecules and because of many years of manufacturing, they are available on a large commercial scale relatively low cost.
- CFCs are very stable compounds which is especially valuable for refrigeration equipment.
- The insulation property is better than air, which means that for the same thermal insulation value a foam material made with CFC will be thinner than a product with air.
- Manufacture of foam insulation using CFCs as the blowing agent results in closed cell structure, which can provide a waterproof insulation board with a high vapour resistance.

Use of foamed plastics for building insulation has increased, as energy conservation has continued to be an important element in new and retrofit construction. Building regulations and public expectations continually demand ever higher standards of insulation.

In addition, more residential as well as commercial buildings use air conditioning systems, resulting in a greater demand for refrigerants. Increased sophistication and efficiency of design as well as improvements on maintenance procedures have reduced the growth of demand, but loss of

CFC FACTS

- Major uses for CFCs and halons are in refrigeration & air conditioners, packaging, polystyrene insulation, aerosols, solvents, hospital sterilant and fire extinguishers.
- CFCs and halons do not occur naturally.
- CFCs are a greenhouse gas, contributing to global warming.
- CFCs have a long life (75-100 years), during which time they release chlorine atoms; a single chlorine atom destroys thousands of ozone molecules.
- All of the earth's ozone gathered together and spread evenly around the globe would be a layer of gas only 3mm thick.
- Ozone absorbs ultraviolet radiation, which can be lethal to man and most life forms.

Increased ultraviolet radiation could cause:
- increased skin cancer (estimates are that a 3% decrease in ozone could cause 2000 additional skin cancer cases in Canada annually. The ozone layer in the northern hemisphere is decreasing by 1.7%-3% a year)
- eye damage;
- damage to plant productivity, including crops;
- damage to one-celled marine organisms, affecting the entire aquatic food chain.
- CFC-12 manufacture has increased from 220 million lbs. in 1960 to 860 million lbs. in 1984.
- In recent 6-year period, CFC 12 concentrations in the atmosphere over Australia have increased almost 50%.

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refrigerants through leakage is still causing a large demand.

How much CFC is produced?

World production has remained relatively constant between 1976 and 1986. In 1986 some 748,000 metric tons were produced worldwide (excluding the USSR, Eastern Europe and China, for which accurate figures are not available).

During the manufacturing processes of polyurethane and extruded polystyrene rigid boards there is a loss of CFCs. As well, the trapped CFCs in the cells are released each time the foam boards are cut or trimmed.

Where are they used?

There are four main applications for CFCs: aerosols, foamed plastics, refrigerants, and solvents. There has been a reduction in the use of aerosols but an increase in refrigeration, air conditioning and foam, especially closed cell form, which is the type used in construction.

Automobile air conditioners are especially bad. Why in the northern part of North America (with short summers) do we need air conditioning in private automobiles? Sure it may be uncomfortably warm for a few weeks, but the hot weather never lasts that long! We seemed to do okay without them for 50 years. Why do we have to do it today? It's only in the last few years that automobile air conditioning has become widely used.

What is the concern for the building industry?

The insulation products using CFCs in manufacture are extruded polystyrene (Dow Chemical's Styrofoam brand is one such product) and the group of materials referred to as rigid polyurethanes. These include polyurethane, polyisocyanurate (such as Thermax) and phenolic rigid foam boards. Sprayed in place polyurethane foam also uses CFCs.

A British study has noted that CFC containing materials amount to about 9% of the total insulation market in the UK.

The use of insulations containing CFCs can be eliminated for most applications by use of alternatives without serious technical or cost consequences. Unfortunately, some applications where these plastic foam materials are more suitable than some of the other alternatives available. However, 60% of CFC containing insulations are used in lightweight roofing and cladding applications where substitution is more difficult. There use has increased in recent years.

The polyurethane foam used for pipe insulation also uses CFCs but the usage is small relative to the total market.

What is being done about CFC use?

On the international scene, Canada took an important role when we hosted a conference in September 1987 in Montreal, at which the Montreal Protocol was signed. This is an international agreement designed to reduce CFC emissions into the atmosphere. It calls for a freeze on CFC consumption at 1986 levels, followed by a 20% cut by 1994 and a further 30% cut by 1999.

Research is being done as producers around the world test alternative materials to determine their environmental acceptability.

Some products exist that, while still damaging to the environment, are much safer than existing materials. Dupont Canada has announced that it will build a plant in Ontario to manufacture HCFC 123, which is a leading candidate to replace CFC-11 (currently used in industrial refrigeration). The ozone depletion potential is 98% less than that of CFC-11. The intent is that with HCFC 123 it will be possible to continue using existing equipment with only small modifications.

The ability to modify existing equipment, rather than total replacement of the thousands of large air conditioners and chillers in use worldwide is the key to a quick reduction of CFC use. Direct substitution of CFCs is not possible at the moment because refrigeration equipment is closely engineered to take account of the physical properties of the refrigerants currently in use.

In the short term, total elimination of CFC based refrigerants is not possible because plant and equipment already in place still requires considerable quantities of refrigerant for maintenance and replacing losses through leakage (between 50% and 75% of refrigerants are used for this purpose).

If complete replacement of all equipment is necessary, it would take manufacturers thirty years at current production rates.

New Legislated Regulations are coming!

A number of jurisdictions are starting to take action to define limits to CFC products.

In **Irvine, California** starting July 1990 it will be illegal to use any building insulation product containing CFCs.

A proposed amendment to the Ontario Environmental Protection Act to regulate ozone depleting substances states that *"No person shall...make, use, transfer, display, transport, store or dispose of:"*

* anything (except prescription drugs) which uses an ozone depleting substance as a propellant;
* any packaging, wrapping or container made with ozone depleting substances;
* anything made in a manner which uses an ozone depleting substance, or if it contains an ozone depleting substance.

A new **Toronto** by-law:

* sets up recovery centres for collecting CFCs from refrigeration and other equipment;
* bans CFC produced styrofoam food containers, insulation and aerosol containers;
* bans test releases of halons from fire extinguishers;
* bans all manufacturing of CFC emitting products, unless there is no alternative and there is a properly operating recovery system for the collection of the CFCs.

Lucien Bouchard, Canada's Environment Minister, has released draft regulations that propose to curb CFC use by more than 85% by 1999. The proposed regulations would prohibit non-essential use of CFCs and halons and prohibit their use where substitutes are available. The draft regulations call for a ban on the import, manufacture, and sale of products which utilize CFCs by Jan. 1, 1990. These would include:

- aerosols
- food packaging foam containers;
- small pressurized canisters including refrigerants, air horns and party streamers;
- portable halon fire extinguishers for home use.

The federal government has also proposed dates for the prohibition of the remaining CFCs in use:

- CFCs in aerosols will be banned by the end of 1989
- CFCs in rigid foams will be banned between 1990 and 1994, depending on type;
- CFCs in flexible foams will be banned between 1990 and 1992;
- CFCs in new refrigerants will be banned between 1994 and 1999;
- CFCs in solvents will be banned between 1990 and 1994, depending on type.

What about the future?

It is clear that for the sake of our children and their environment we must eliminate the use of CFCs.

The construction industry, has to consider what sort of options are available. Some of these include:

- use alternate insulation materials
- Develop alternate blowing agents for foamed insulation products.
- design buildings to reduce the need for air conditioning.
- develop alternative refrigerants for air conditioning systems
- develop collection equipment and procedures to replace leakage and loss in both manufacture of foam products and refrigeration plant.

The last option assumes continued but more efficient use of CFCs which may be necessary at least in the short term for the transition to alternatives.

The main problem may be for those applications where the waterproof characteristics of the foam insulation is an important advantage. For example, the inverted flat roof, where the insulation is placed over the roofing membrane. This is more commonly found in commercial applications, but occasionally is also used in residential construction.

For below grade applications, waterproof materials are needed also, especially under a slab (for vertical walls below grade rigid fibreglass panels have proven to be very effective not just as insulation but also as draining boards).

In temperate and cooler climates it should be possible to return to building forms and designs where sensible comfort conditions can be provided without requiring full air conditioning.

Air conditioning should not be needed for any residence in any location in Canada. Proper design and insulation levels will ensure that the home is comfortable in all weather conditions. It may mean that during a summer heat wave for a few day the home may be warm, but certainly not unliveable (after all, until recently, air conditioning of houses was unheard of).

The situation is a little different in commercial and industrial buildings, but even there air conditioning loads can be drastically reduced by proper design.

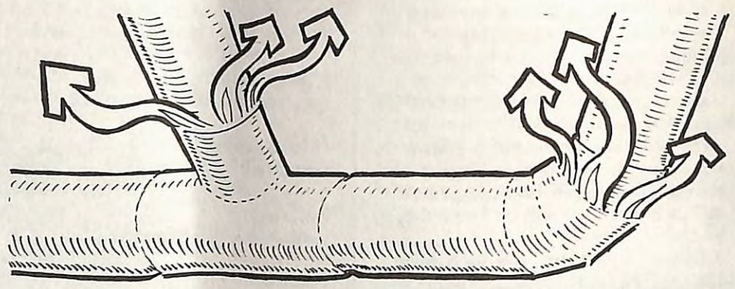
The measure of thermal performance is the thermal conductivity (or k-value). It is defined as the amount of heat energy conducted through a uniform material. The lower the k-value, the better the insulating property. This table lists the k-value of common insulation products.

Material	k-value (w/m^2k)	k-value (BTU/hr-sf°F)	R-value[1]
Rigid polyurethene foam (impermeable facings)	**0.017***	**.096***	**10.44***
Rigid polyurethene foam (permeable facings)	**0.022***	**.124***	**8.06***
Polystyrene foam (extruded)	**0.022-.036***	**.124-.204***	**4.9-8.06***
Polystyrene (expanded) -beadboard	0.035	.198	5.05
Phenolic foam	**0.02***	**.11***	**9.09***
Cork board	0.042	.238	4.2
Rockwool batts/slabs	0.037	.210	4.76
Glasswool batts/slabs	0.04	.227	4.4
Fibre insulating board	0.049	.278	3.59

(contains CFCs)*

[1] R-values noted are imperial, for a unit thickness of material. To give an indication of the magnitudes.

Heat Losses from Forced Air Heating Systems (Duct Losses)



Past analysis of air infiltration in residential buildings has found that there is more air leakage in houses with forced air and combustion heating systems. The total heat losses due to leakage in homes with ducting located in unheated spaces is especially great. But how much?

A major study to find out was undertaken in the U.S. Pacific Northwest. The results were presented at the recent ASHRAE conference in Vancouver.

Energy consumption and airtightness data for 820 electrically heated houses built since 1980 were examined. Half of the buildings were energy-efficient structures built to the Model Conservation Standards (MCS) developed in the region; the rest were conventional new houses representative of current building practices.

The houses were monitored for one year. They were audited to determine insulation levels and occupancy characteristics. In the analysis of the monitored data was found that heating system type is important in determining the relative efficiency of electrically heated houses.

Houses with electric forced air heating systems used an average of 22% more space heating energy than those without them (on average an extra 1.40 kWh/ft^2).

Through the use of fan pressurization and tracer gas tests it was observed that houses with forced air systems had much higher levels of air leakage. The tracer gas tests indicated an average of 70% higher levels of air change rate in the conventional houses with forced air space heat as opposed to baseboard systems.

There was no study of natural gas heated homes, but the basic principles would still apply.

The energy efficient houses were built in 1984 and monitored during the 1985-1986 heating season. The thermal performance of the MCS houses was superior, using an average of 2.55 kWh/ft^2 less space heat electricity than the conventional group.

When the Model Conservation Standard was developed it was assumed that the air change rate in conventionally built houses averaged about 0.6 air changes per hour (ACH). In theory this presented a major opportunity for energy conservation savings.

The MCS houses were designed to be draft-free with sealed polyethylene vapour barriers and heat recovery ventilators. It was assumed that the MCS houses would have a natural air change rate (induced by wind and temperature difference) of about 0.1 ACH plus another 0.5 ACH provided by mechanical ventilation (heat recovery ventilators with a minimum 60% of the heat being recovered). This results in a net reduction of 0.3 ACH over the conventional houses.

Analysis of the energy efficient houses found that heating system type accounted for dramatic differences in electric space heat consumption. The energy losses are due to conductive heat loss and airflow leakage from the heating ducts. In addition to inefficiencies during operation, leaks in heating ducts contribute to air infiltration.

How big a problem is this leakage?

Overall, forced-air heating systems used an average of 17% to 22% more space heat than non forced-air electric resistance systems. The study also demonstrated a strong link between forced-air heating systems and air leakage in the houses.

Duct leaks increased the blower door measured equivalent leakage area of a house by an average of about 10%.

Duct air leakage and associated heat transfer are serious for building energy consumption budgets. Although the increased effective leakage area from duct systems may only be about 15% more than in houses without ducts, the overall increase in air leakage and space-conditioning energy consumption is likely to be much greater.

Induced air leakage from combustion systems with chimneys would probably be greater than the results shown in this study since only flueless electric forced-air systems were examined.

Ducted forced-air homes were leakier and used more heat than unducted homes. Ducted conventional homes were 26% leakier than unducted conventional and used 40% more heating energy. The incremental leakage and thermal losses due to presence of ducting were substantially lower in energy efficient homes. Ducted MCS homes were 22% leakier and used 13% more heating energy than unducted MCS homes.

Differences in leakage produces a net pressurization in most homes during furnace fan operation. Fan induced leakage in return ducts was substantially greater than in supply ducts.

Incremental leakage and thermal loss due to ducting in the energy-efficient homes tested was reduced by construction features used. The relative importance of each of these features is not specifically determined. These include:

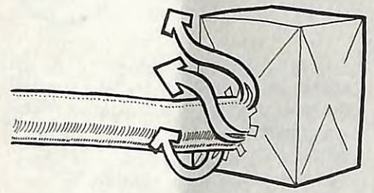
- ducts located inside the heated space whenever possible
- duct insulation greater than called for by code
- above code envelope insulation
- continuous vapour barrier construction
- heat recovery ventilation

A group of houses were chosen to measure the impact of remedial work, as duct leakage reduction may be a relatively easy and cheap conservation measure. Homes were selected based on the presence of a ducted heating system outside the conditioned area.

A typical configuration consists of supply ducts located in a vented crawl space and a return duct in a vented attic. The homeowners of these houses tended to be energy-conscious, as noted by their willing ongoing participation in an energy research project, and the homes are probably better built than the norm. Thus, the leakage identified in the study are probably conservative.

Part of the leakage problem lies in poor standards for installers as the building code does not require specific sealing measures. The contractor does not always check on the quality of the subtrades work. At least a visual inspection of the installation should be done. All of the serious errors observed were direct and obvious. Any inspection of the crawlspace would have noted the errors.

A visual inspection is made easier by noting that errors tend to occur with specific components:
- 90° elbows can fall apart;
- seams at Y-joints may be ripped;
- obvious dirt on fibreglass duct insulation is a sign of air leakage;
- furnace filter slots are usually poorly sealed;
- the ends of flexible ducts are often poorly sealed;
- the longevity of duct tape is questionable;
- duct tape is inadequate for sealing butterfly or finger joints where a round duct is butted into a square plenum. For this application, a commercial latex sealant designed for heating applications is needed.



It is cost effective to include duct repair in residential retrofit programs, such as utility-sponsored weatherization. Code requirements should articulate and enforce duct installation standards for any new housing that includes forced-air heating systems.

Other than visual inspection there are no useful diagnostic tools.

In many areas, it would be unheard of to locate heating ducts outside the heated building envelope, yet, in many milder climate areas, it is quite common. Especially in single storey bungalows the house design often makes it difficult to find a good place to locate ducts inside the building. What has been noted about ducts outside the heated envelope also applies to ventilation only ducting.

Steps to take to avoid problems:

1. in new construction, locate ducts inside the conditioned space;

2. inspect installations for obvious errors;

3. use sealant on duct joints and seams;

4. pay special attention to specific components (elbows, Y-joints, flexible duct, finger joints);

5. caulk and seal floor penetrations.

This item summarizes material the following papers presented at the ASHRAE Annual Meeting, Vancouver,B.C. June 1989

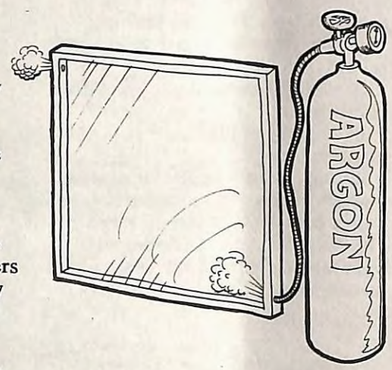
Effects of Ducted Forced-air Heating Systems on Residential Air Leakage and Heating Energy Use
L.A. Lambert, P.E.; D.H. Robison, P.E.

Evidence of Increased Levels of Space Heat Consumption and Air Leakage Associated with Forced Air Heating Systems in Houses in the Pacific Northwest.
D.S. Parker

Field Investigation of Residential Infiltration and Heating Duct Leakage
D.H. Robison, P.E.; L.A. Lambert, P.E.

Gas Filled Windows: Why they make sense

by Tim Mayo



Many glass manufacturers are now starting to gas fill their units. Gas filling is a low-cost procedure which provides a major improvement in the thermal performance.

In addition to having good heat insulating qualities, gases need to be non-corrosive, stable in the sun, non-toxic and non-diffusive through spacers and sealing materials. The chemically inert gases-such as helium, neon, argon, and krypton meet these requirements.

Argon is the gas most often used for gas filling because it is cheaper and more readily available than the others (but it is not the most thermally effective).

As two-thirds of the heat lost through glazing is radiated, the first strategy is to block those losses with a low-emissivity coating. Gas filling is the next step; it improves thermal performance for units which already have a low-E coating. In fact, as the table shows, without the low-E coating the benefit of gas fill is small.

Gas filling also improves units with a suspended plastic film, such as Heat Mirror 66. Argo improves the performance of these triple-glazed units by 14 percent, while krypton offers an amazing 30% benefit.

Krypton gas is particularly impressive in glazing units where small thickness is of prime importance. For example, the thermal resistance of a double glazed, sputter-coated low-E unit is the same R3.2 whether the space is 6mm (¼") or 12.7mm(½").

These figures, all based on the entire glazing unit, including edge effects, show that gas filling can substantially improve the thermal resistance of window units made of low-E glass. In fact, gas filling is the only way you can improver thermal performance without a corresponding reduction in solar transmission.

Calculations for a typical 2000 sq ft house show that double-glazed windows with a low-E coating can annually save up to $0.30 per square foot of window (25 percent frame area), while double glazed, low-E, argon-filled windows can save $0.47 per square foot without sacrificing any light or solar gains.

The real benefit of gas filling is the increase in temperature of the inside surface of the glass, which reduces condensation on glass. Under standard *ASHRAE winter design conditions* the interior glass temperature for a regular double glazed unit is a chilly 7°C. With a low-E coating, the surface temperature rises to 12°C. Add gas and the temperature jumps to over 13°C, enough to allow a 62% relative humidity indoors without any condensation with an outdoor temperature of -18°C.

EFFECT OF GAS FILLING
(calculated for 3 ftx 4ft insulating glass window with ½" aluminum spacers, including spacer effect; ie. R-value is for the total window unit)

GLASS TYPE	Thermal Resistance (R-value)		
	Air	Argon	Krypton
Standard double	1.9	2.0	2.1
Double with sputter-coated low-e	2.7	3.1	3.3
Standard triple	2.7	2.9	3.0
Triple with 2 low-E	4.0	4.5	4.7

Serviced your Railway Switch heater yet?

It seems that for tariff purposes, furnaces are listed under the heading "railway switch heater". This came to light almost by accident when it was uncovered recently that an application had been made for an acceleraterd tariff reduction (under the Canada-USA Free Trade Agreement). Canadian furnace manufacturers were caught off guard as the heading is so obscure no one was looking!

This should be of concern to us. Last year we commented that unless Canada had minimum standards, we may be on the receiving end of obsolete equipment out of the USA as manufacturers dump obsolete products in Canada *(Solplan Review No.21 & 22)* when new energy regulations come into effect in the US in 1992.

The president of HRAI assured us that it would not be so, as the regulations apply at the manufacturing level. Well, it seems that he was misled. The US regulations apply to equipment sales, not manufacture. If manufacturers can get away with selling inefficient, obsolete products in other countries, they can still manufacture them. As we stated, multi-national corporations are in an excellent position to move technology across borders, especially if it is profitable.

Heat Recovery Ventilators: Equipment Update

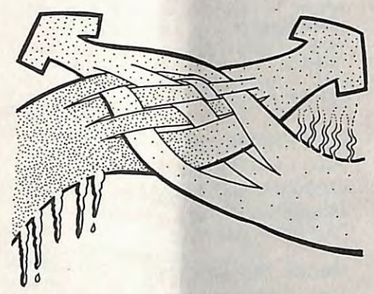
It's been 2 years since our last update on Heat Recovery Ventilator equipment. Since that time the industry has seen much growth and is showing a new maturity. There is less chasing after paper efficiency ratings and more stress on equipment performance and quality. Manufacturers now offer a range of products, suited for a variety of dwellings sizes and applications.

While no definitive statistics exist, it seems that about 10% of new housing in Canada is now equipped with HRV's. Market share varies according to region, with the majority of new housing in Atlantic Canada being fitted with HRV's or good quality ventilation equipment. (One estimate we've heard is that 70% of new housing in New Brunswick have mechanical ventilation - mostly HRVs).

Table A lists efficiency ratings and power consumption of units tested by ORTECH. These figures are the ones used by the HOT 2000 program for R-2000 Program design evaluation of homes.

We also list the key specifications and features of the units on the market. We have compiled the information from manufacturer's data. We hope this will provide our readers with an idea of the kinds of equipment available.

We had considered providing pricing information. We have opted not to do so as all manufacturers did not provide us with information that is comparable. Some provided list prices, others wholesale or contractor prices, yet others retail. Because there are so many discounts and options, price information is meaningless. However, there does appear to be very little real price differentiation between the equipment of a comparable capacity. Purchase decisions should be made on the basis of suitability for a given application and dealer support in the local area and not just on price alone.



Many manufacturers produce large capacity units for commercial or special purpose use. Because they are for special applications, we've only identified the model and airflow capacity range. For specific details contact the manufacturer.

Putting together this list has been both instructive and frustrating. While the manufacturers have refined their product lines, they still require some work on their product literature. Trying to find the key technical features of some of the products involves a major search. In some brochures you have to wade through much irrelevant information.

There are two kinds of literature needed. One is general data aimed at the public to educate what ventilation is all about and highlight the unique features of the product. The second and perhaps more important, is a technical fact sheet for the professionals who will be specifying or making purchase decisions. The general public information sheet is not enough, as professionals are more interested in technical, performance and installation details of the equipment.

The criteria we have highlighted for each model are the features that a designer or installer needs to know for design purposes. It is surprising how difficult it is to get some of this information. In some cases, it's not in the literature at all.

Airflows for units that have been tested be ORTECH have not been listed as they appear in Table A.

All manufacturers brochures stress the value of clean filtered indoor air that is available to systems using HRVs. Yet surprisingly only Star provides any specs on the quality of filtration provided.

Most manufacturers offer a range of products. Unfortunately, the tendency is to follow the American auto industry marketing model (the one that sells you a car without the wheels, and the options list may include seats, windows, steering wheel, etc). In other words, you can't get a functioning car off the lot without fighting a list of options.

CES (Van EE) doesn't hide the fact: they just label their model by the series. It may be one way to offer a range of options, but it calls for a knowledgeable supplier to decipher the options and offer specific packages to suit given climatic conditions. We don't mean to single out CES as they are not alone with this marketing strategy.

AIRXCHANGE INC.
401 V.F.W. Drive
Rockland, MA 02370
Tel: (617) 871-4816
Fax: (617) 871-3029

This company's units use a heat wheel that recovers heat and a portion of moisture - so it does not excessively dry out the house. Heat transfer wheels are available in desiccant or sensible versions, and they are inter changeable. Desiccant wheels provide maximum efficiency when air conditioning or to retain some humidity during winter. Sensible wheels provide maximum drying in cold climate.

Model: 502
Core: rotary wheel

Defrost: damper reduces exhaust flows at -15°C incoming air. Electric preheater for cold climate conditions.
Dimensions: 29 3/8" x 17½" x 10¼
Weight: 44 lbs.
Mounting: ceiling, wall or floor
Duct: 7"
Filters: replaceable filters in unit
Options: return air boot for ducted exhaust; variable speed control
Notes: designed for single, central location to pick up exhaust air. Only supply air is ducted. Ducted exhaust is an alternative requiring a return air boot.

Model: 504
Core: rotary heat wheel
Defrost: damper, thermostatic control to reduce air flow to 70 CFM when outdoor temperatures drop to -15°C.
Dimensions: 29¼" x 17½ x 10".
and 24" x 8" x 8" supply air module
Weight: 44 lbs.
Mounting: wall mount (on outside wall). Wall vents supplied with 7½" sleeve that may be modified to suit wall thickness.
Duct: supply air register may be located remote from unit using standard 8"x8" ducts.
Notes: This is a unit more suited to commercial or light industrial areas, such as: classrooms, locker rooms, print shops, beauty parlours, offices, conference and copy rooms, smoking lounges, bars, etc.
Air flow capacity: 70 - 200 CFM with variable speed control.

Model: 570
Core: heat wheel
Defrost: automatic motorized damper shuts off intake air at pre set temperature.
Dimensions: 22¼" x 12 5/8" x 7½"
Weight: 25 lbs
Mounting: recessed wall mounting (on exterior wall), non ducted HRV
Filter: replaceable filter
Airflow capacity: capacity 30-70 cfm with variable speed control.
Notes: Model 570 D is a ceiling mounted unit version. These are non ducted HTVs designed for mounting in a central location.

Model: RTV-1000 A rooftop unit for areas needing larger ventilation air flows: 500-1000 CFM .

AIR CHANGER HRVs
Preston Brock Mfg. Co.
Box 3367, 1297 Industrial Rd
Cambridge, ON N3H 4T8
Tel: (519) 653-7129
Fax: (519) 653-4781

Model: 150
Core: plastic, counter flow
Defrost: supply air fan shut-down thermostatically controlled; duration is controlled by a time delay and temperature differential.
Dimensions: 50" x 15" x 25"(double core model)
Weight: 78 - 126 lbs. (depending on options)
Mounting: suspended
Duct: 6" diameter
Options: pressure balancing kit (senses negative pressure in house) built-in dehumidistat, single speed (no defrost)
Notes: available in single or double core version

Model: 275
Core: plastic, counter flow
Defrost: as for model 150
Dimensions: 66" x 15" x 30"
Weight: 162 - 166 lbs
Mounting: suspended
Duct: 6" cold end; 7" warm end
Options: as for 150

BLACKHAWK
#205 - 409 Granville St.
Vancouver, B.C. V6C 1T2
Tel: (604) 682-2642
Fax: (604) 662-8312

Model: Blackhawk XL
Core: plastic counterflow
Dimensions: HRV: 67" x 25" x 28
Fans: 13" x 9" x 20"
Weight: HRV: 100 lbs; Fans: 23 lbs.
Duct: 8"
Filter: washable filters
Airflows: to 350 CFM
Notes: this unit has a fan unit separate from core unit. Controlled by microprocessor that monitors temperature, defrost, airflow, static pressures and wind load, ORTECH test results expected soon. This unit has by far the most attractive, 4 colour brochure. Unfortunately, useful technical information is difficult to find easily.

CONSERVATION ENERGY SYSTEMS
3310 Millar Ave.,
Saskatoon, SK S7K 7G9
Tel: (306) 242-3663
Fax: (306) 242-3484
USA: CONSERVATION ENERGY SYSTEMS
Box 10416
Minneapolis, MN 55458
Tel: Toll free (U.S. only) 800-667-3317

Model: vanEE 1000 series
Core: plastic crossflow
Defrost: temperature activated damper
Dimensions: 21" x 24 3/4" x 13"
Weight: 65 lbs.
Mounting: suspended
Ducts: 6" flexible to outside 5" to inside
Filter: washable foam filter
Options: remote humidity sensor, solid state variable speed control.

Model: vanEE 2000 series
Core: plastic crossflow
Defrost: temperature activated damper blocks outside air supply while allowing warm house air to circulate.
Dimensions: 34" x 20 3/4" x 17"
Weight: 75 lbs.
Mounting: suspended
Ducts: 6"
Filter: washable foam filters
Notes: units can be customized to suit specific applications: 2 speed control, options, defrost, remote or case mounted hehumidistat, 20 minute electronic high speed timer.

Model: vanEE 2000 Plus
Core: plastic, crossflow double core
Defrost: as for vanEE 2000
Dimensions: 52½ x 21 3/4" x 17"
Weight: 100 lbs.
Ducts: to outside 6" to inside 7"
Filters: washable foam

Model: vanEE 7000 is for larger residential and commercial applications, capable of airflows to 700 CFM.

ENVIRONMENT AIR LTD.
Box 10
Cocagne, N.B. E0A 1K0
Tel: (505) 576-6672
Fax: (506) 576-9838

This company makes 2 types of HRVs. One uses a heat pipe core which has sealed pipes filled with a refrigerant; warm exhaust air is passed by one end of the pipe, cold incoming air by the other end. The refrigerant moves heat from the warm air stream to the cold air. The second type this company makes is a flat plate heat exchange core.

Model: ENV-K5
Core: Heat pipe
Defrost: factory preset blower shut down.
Dimensions: 20½" x 24" x 11"
Weight: 32 lbs
Mounting: suspended
Duct: 5"
Filter: disposable fiberglass
Airflow: to 125 cfm

Model: ENV-K6
Core: heat pipe
Defrost: factory preset blower shut down defrost cycles of 23 minutes normal operation, 5 minutes defrost.
Dimensions: 27" x 29" x 12"
Weight: 60 lbs
Duct: 6"
Filter: disposable fibreglass
Airflow: to 200 cfm

Model: ENV-K8
Core: heat pipe
Defrost: factory preset blower shut down defrost cycles of 23 minutes normal operation, 5 minutes defrost.
Dimensions: 30½" x 28" x 14"
Weight: 75 lbs
Duct: 8"
Filter: disposable fibreglass
Airflow: to 390 CFM

Model: ENV-K10
Core: heat pipe
Defrost: factory preset blower shut down
Dimensions: 32" x 30" x 16"
Weight: 90 lbs
Duct: 10"
Filter: disposable fibreglass
Airflow: to 600 CFM

Model: ENV-W60
Core: heat pipe
Defrost: factory preset blower shutdown
Dimensions: 10¼ x 14¼ x 7"
Weight: 15 lbs.
Filter: washable
Airflow: to 60 CFM
Notes: a non ducted wall or window mounted HRV

Model: ENVIRO SE-200
Core: aluminum plate, cross flow
Defrost: initiated by temperature sensor in cold supply, internal damper blocks cold air and indoor air is drawn into cold side; fan is run at high speed 3 minutes defrost for 30 minutes run time.
Dimensions: 21 5/8" x 30" x 17"
Weight: 99 lbs.
Mounting: suspended

Model: ENV1RO DX-300
Core: aluminum plate, crossflow, double core
Defrost: as SE -200
Dimensions: 23 5/8" x 43 3/8" x 17 3/8"
Weight: 158.7 lbs.

NUTECH ENERGY SYSTEMS INC.
124 Newbold Court
London, ON N6E 1Z7
Tel: (519) 686-0797
Fax: (519) 685-9800

Model: Lifebreath 100
Core: aluminum plate, crossflow
Defrost: initiated by motorized damper that shuts off incoming cold air, allowing interior air into the supply side, defrost cycle is 2½ minutes for a 30 minute run time.
Dimensions: 24" x 10½" x 18½"
Weight: 66 lbs
Mounting: suspended
Duct: 5"
Filter: washable
Notes: variable speed control. Far north version available for areas to -40° winter design temperature, exhausted defrost time and low power consumption.

Model: Lifebreath 150
Core: aluminum plate, cross flow
Defrost: electric pre heat
Dimensions: 31" x 14.75" x 19"
Weight: 72 lbs.
Duct: 6"
Filter: washable
Notes: 3 speed motor no dehumidistat

Model: Lifebreath 195
Core: aluminum plate, crossflow
Defrost: as for Lifebreath 100
Dimensions: 49" x 14 3/4" x 19"
Weight: 100 lbs.
Duct: 6" in; 7" out
Filter: washable
Notes: built in dehumidistat electronic speed control

Model: Lifebreath 200
Core: aluminum plate, cross flow
Defrost: 1300 w electric preheat defrost or damper style defrost
Dimensions: 31" x 14 3/4" x19"
Weight: 72 lbs.
Duct: 6"
Notes: built in dehumidistat; variable speed control

Model: Lifebreath 300
Core: Aluminum plate, cross flow, double core
Defrost: damper style
Dimensions: 49" x 14 3/4" x 19"
Weight: 108 lbs.
Duct: 6" in; 7" out
Filter: washable
Notes: built in dehumidistat

Model: 1200 designed for large residential, commercial and industrial applications. Airflows 500 - 1200 CFM.

STAR HEAT EXCHANGERS
B109 - 1772 Broadway St.,
Port Coquitlam, B.C. V3C 2M8
Tel: (604) 942-0525

Star Heat Exchange Corp of Port Coquitlam has been acquired Cantech Systems Ltd. of St. John's, Newfoundland. The company retains its name, and will start production at a new plant in Port aux Basques, Newfoundland in January 1990. Research and product development will be done out of the new plant in Port aux Basques.

The founders of the company, Michael Lucking and Guillermo Larain will continue their involvement with the company. They will run the sales and marketing operation out of Port Coquitlam.

Until the new plant is operational, sales will be handled from Port Coquitlam out of inventory. The plans are to maintain a warehouse in Winnipeg to serve Western Canada and Eastern Canada from the plant.

Star plans to have its through the wall NOVA unit tested by ORTECH soon.

Model: Nova
Core: plastic, counter flow
Defrost: temperature initiated fan defrost
Dimensions: 24 3/4" x 15 7/8" x 7½"
Weight: 12 lbs.
Filter: high efficiency pleated
Airflow: to 70 CFM
Notes: This is a non ducted, wall mounted HRV; variable speed control; will be tested by ORTECH soon.

Model: Star 165
Core: plastic counter flow
Defrost: temperature initiated fan defrost or diverter valve.
Dimensions: 12½" x 40" x 15"
Weight: 22 lbs.
Ducts: 7"
Airflow: to 160 CFM
Filter: high efficiency pleated
Notes: unit designed for low pressure system (20 - 30 Pascals) not the 75-100 of typical HRV layouts. Variable speed control
Options: radon sensor; humidistat; microchip control that can do automatic self balancing, blower door test, LCD airflow display

Model: Star 200
Core: plastic counterflow
Defrost: temperature initiated fan defrost or diverter valve
Dimensions: 25" x 39" x 15"
Weight: 40 lbs.
Ducts: 8"
Filter: high efficiency pleated
Airflow: to 180 CFM
Notes: unit designed for low pressure (20-30 Pascals) systems; variable speed control
Options: as for Star 165

Model: Star 300
Core: plastic counterflow
Defrost: as for Star 200
Dimensions: 25" x 39" x 15"
Weight: 44 lbs.
Ducts: 8"
Filter: high efficiency pleated
Options: as for Star 165

VENMAR VENTILATION INC.
1715 Haggerty St.
Drummondville P.Q. J2C 5P7
Tel: (819) 477-6226
Fax: (819) 474-3066

Model: HRV 3055
Core: plastic crossflow
Defrost: temperature activated sensor activates damper to recirculate indoor air. Run time 35 minutes, 5 minutes defrost
Dimensions: 30¼" x 20" x 15"
Weight: 60 lbs.
Filter: washable mechanical
Notes: auto model has dehumidistat, ionizer and switch, and operates continually; intermittent operation runs only when humidity sensor calls for operation.
Option: silencer, electric heater

Model: HRV 5586
Core: plastic crossflow
Defrost: as 3055
Dimensions: 40¼" x 20" x 19"
Weight: 80 lbs.
Duct: 6"
Filter: washable mechanical

TABLE A
HRV EFFICIENCY RATINGS

MODEL	AT 0°C (32°F)				AT -25°C (-13°F)		
	airflow capacity (@75 Pa)	efficiency	airflow	power consumption	efficiency	airflow	power consumption
AIRCHANGER							
DRA 150	104cfm	76%	117cfm	72w	57%	117cfm	72w
DRA 275	231	78%	117	126	56%	117	216
AIR-X-CHANGE							
502 CA	142	77%	117	104	43%	117	1172*
CES							
vanEE 1000 SLD	129	67%	64	69	58%	64	69
vanEE 2000/2D	237	64%	117	100	58%	117	87
vanEE 2000/2DM	216	70%	117	116	60%	117	120
vanEE 2000 Plus	237	83%	117	142	58%	117	144
ENVIRONMENT AIR							
ENV-K6	182	63%	117	130	63%	117	150
Enviro SE-200	172	65%	117	122	62%	117	128
Enviro DX-300	246	78%	117	212	72%	117	220
NUTECH							
Lifebreath 100-DEF	64	64%	64	82	58%	64	80
Lifebreath 195-DCS	182	80%	117	117	77%	117	123
Lifebreath 200-MAX	193	60%	117	100	60%	117	100
Lifebreath 300	235**	79%	119	150	75%	117	156
STAR							
300 MPC-DV	186	79%	117	128	67%	117	138
VENMAR							
3055	168	64%	117	82	56%	64	58
5585	210	68%	117	154	61%	117	132

NOTES:

** This unit uses an electric preheater*
*** Airflow at 100 pascals*

Airflow capacity at 75 pascals pressure is an indication of the capacity of the equipment when installed in a typical system. Some equipment is designed to operate at a lower pressure.

This Table lists efficiency ratings and power consumption, as tested by ORTECH. These figures are the ones that are used for R-2000 Program design evaluation by the HOT 2000 computer software to perform simulations of house energy consumption. We have only listed those units that have been tested by ORTECH. Other models made by these manufacturers and others are available, but we do not have the test lab spec sheets, or they have not yet been tested by ORTECH.

Letter to the Editor

Sir,

Having just read the August-September issue of **Solplan Review**, I am compelled to comment on your editorial about the Canadian building industry.

As an American, I almost felt as if I was eavesdropping, seeing a Canadian publication writing to Canadian readers about the "typical Canadian inferiority complex". U.S. builders build good houses (just ask 'em). But in the realm of cold-climate construction, the U.S. building industry and building science community often look north of the border for practical answers.

If you look at almost any U.S. book, manual, magazine or newsletter on cold climate construction written in the past ten years, you see a preponderance of principles, techniques and products developed in Canada, not Sweden. As a fellow editor, I constantly rely heavily on not only the Canadian research community, but the homebuilding industry as well.

Yes, we too have many accomplishments to be proud of (just ask us). But "superinsulation" was developed in Canada; heat recovery ventilators were developed in Canada and most of the best HRV's are still made in Canada. The "air/vapor barrier" was tested and proven in Canada; and it's alternative, the "Airtight Drywall Approach" was also developed there. A Canadian engineer is writing the new U.S. Department of Energy manual on moisture control in houses.

The list goes on, but I'll stop there. I agree with the gist of your editorial that there is room for improvement, but while I am eavesdropping, I thought I would just whisper in the window that the U.S. building community has been taking good advantage of Canadian talent and expertise for a number of years. Thanks.

By the way, the articles on cellulose insulation were very informative. On a related topic, a big problem in the U.S. these days is lack of information on wet-spray cellulose. Luckily, two Canadian government agencies and one Canadian manufacturer are sponsoring research on this topic. Thanks again.

I always enjoy your publication. Keep up the good work.

J.D. Ned Nisson, Editor
Energy Design Update
New York, N.Y.

Thanks for the comments. Yes, we have done much to improve building practices, but one can't rest on their laurels.

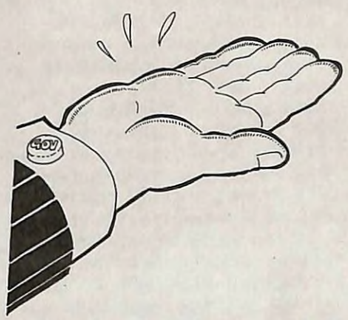
My concern is that a lot of the work done in Canada has been in spite of the building industry. Much work was done out of government laboratories, or supported by public funds in aid of government programs such as the energy conservation drive of the late 1970's which led to the R-2000 Program and many innovations you speak of.

The building community wants to rely on the free market. Unfortunately, the marketplace too often has a narrow perspective. The bottom line each quarter above all else, is not conducive to long term research. One just has to look at what happened to the research facility at Owens-Coming; it was the first to get chopped when financial manipulations got in the way.

The current fashion is to reduce government involvement and to 'privatize' government agencies. I fear that is going to leave us without the capacity to undertake the significant work that needs to be done.

The segment of the building industry you look at so fondly is still very much a small elite. The bulk of the building industry still needs to be convinced of the importance, and more importantly, to put into daily practice the things we are learning are technically correct.
R.K.

The GST: how much will it really cost?



The Government has announced the new 9% goods and services tax (GST) to be introduced in 1991. As housing is such a big ticket item, the impact of the tax on the housing industry will be substantial. The new tax which is to be applied on all services as well as materials replaces the current manufacturer's sales tax (FST) which is applied at the wholesale price on products only. According to the government, the tax will be "revenue neutral". But will it be? (the new tax is a value added tax; you pay the tax on everything you get, but get credit for when you sell your product).

The government is saying that the existing FST now applied on materials will disappear when the new tax is introduced, and that no one will take advantage of the chance to raise prices. The Canadian Homebuilders Association (CHBA) has used a realistic (and conservative) assumption that one third of the existing tax will remain as hidden price increases.

How much are we paying in FST now? Calculations made for CHBA by Clayton Research Associates are that the effective existing FST tax rate across Canada is 3.72% of the selling price of the average new home (from a low of 2.2% in Toronto, to a high of 4.71% in Trois Rivieres and 5.7% in Charlottetown; the variation is due to varying land costs).

The GST will apply on the sales price. The proposal is to offer a 4.5%

rebate to homebuyers of new homes up to $310,000. The Finance Minister claims that the net impact will only be an increase of 0.3% (of the sales price). According to government figures, this would mean a net increase for the "average" home of $480.00 (depending on city and price it could be a reduction of up to $650, or an increase of up to $4,450).

For a "typical" $150,000 house, CHBA estimates the current FST included in the sales price is $5,350. Under the new proposed tax, *if there are no price increases,* the new tax (after the homeowner's rebate) will be $6,509 or a $1,159 increase (only a politician can get away calling that revenue neutral!). If there are price increases as CHBA suggests, as is quite likely, the net increase is likely to be more like $3,025.

What's Happened to Energy Standards in Canadian Codes?

Next January a key meeting of the Associate Committee on the National Building Code will decide the fate of the *Measures for Energy Conservation*. Introduced with great fanfare in 1978 the *Measures* recommend minimum energy conservation standards to be incorporated in the Provincial Building Codes. Since their introduction, the *Measures* have encountered substantial opposition and to date only one province (Quebec) has adopted the *Measures*. Although they still exist, the initiative was effectively crippled when five years ago the National Research Council was forced, because of funding cutbacks, to drop their technical support for the project.

Recently, the Associate Committee proposed to formally discontinue publication of the *Measures* and disband the Standing Committee but intervention from the provinces, particularly Ontario, has forced the Associate Committee to reevaluate the initiative. Although Ontario's recent support for the initiative is perhaps surprising given that the province has not adopted the *Measures*. Enrico Dinino, Program officer with the Ontario Ministry of Energy explains that the proposed amendments to the 1990 Ontario Building Code used the *Measures* as a guideline. Dinino says that without the independent research work carried out by the National Research Council there would be a need for each of the Provinces to duplicate their efforts.

Before the January deadline, officials from the Provinces and the Federal government are meeting to see if sufficient funding can be found to continue the initiative. Dinino explains there are two tasks involved. First, there is an immediate need to update the existing prescriptive measures requirements so that the document reflects the technical developments and energy price changes that have occurred in the past few years. Second, there is a longer-term requirement to investigate the need to develop a performance-based codes for both residential and commercial buildings that would provide the building designer more flexibility and would allow the designer to make cost and performance trade-offs particularly in terms of the building envelope and mechanical system design.

While it is fashionable to say that the marketplace will define how much energy efficiency is appropriate, we must not forget that the current environmental mess we are facing was largely shaped by market forces. Someone must start to spell out minimum standards to be met. Building energy use is significant. Appropriate steps taken to reduce energy building consumption will have a large impact on our environment.

Blueprint for a Healthy House Conference

April 26-27, 1990, Cleveland, Ohio

Conference on pollution in the home includes: 1990 UPDATE on indoor air quality issues; How to build a Healthy House; Occupant Concerns and responses to them.

Pre-Conference Seminars, Exhibits
For Information Contact Al Wasco, Housing Resource Center, Cleveland, Ohio.
Tel: (216) 281-4663

Fan ratings to order

Recent changes to the ventilation requirements of the B.C. Building Code were developed on the basis of state of the art knowledge of ventilation rates for homes.

The result is a detailed set of requirements which, while far from perfect, is perhaps the most advanced in North America. They apply to all housing (not just a select group of high quality homes that may be built to program standards such a R-2000, Super Good Cents, etc). However, being in the lead has its costs.

The Code calls for performance, but no one involved with the drafting process checked what equipment was available in the market. At the top end, there's good equipment including HRV'S and quality fans. At the low end (the equipment most likely to be used in a large portion of basic spec houses), there are fans that perform far below expectations.

The B.C. Code has a magic figure of 85 CFM. This is the minimum ventilation rate that must be controlled automatically (for a 2150 sq ft. or larger house). The code further requires that equipment be rated at 50 Pascals (0.2" WG) and equipment must be sound rated for a max of 2.5 sones. So what's the problem?

The standard HVI tests (which are the ratings most commonly used with the equipment) are done at a pressure rating of 0.1" WG - essentially at no pressure, even though attaching any duct-work and exterior hood will generate more pressure.

Fans most commonly used fall short of the 85 CFM rating at 0.2" WG. With the introduction of ventilation requirements, many builders were facing the need to go to much more expensive equipment or to use several fans.

As B.C. is only a small part of the Canadian market, the incentive is not there for manufacturers to go out of their way to retool and redesign equipment.

Surprisingly the manufacturers have responded. They've either done a quick re-tooling, or they've re-tested the same equipment and miraculously discovered that their equipment does in fact deliver more air at the higher pressure than was the case before. (The new literature looks suspiciously like the earlier stuff, with new figures that satisfy the B.C. requirements.) Unless the equipment was really modified, someone is being less then truthful.

As we reported earlier (*Solplan Review No. 24*) a study of existing residential exhaust equipment (done by ORTECH and HRAI for CMHC) showed that most fans do not deliver rated air flows. The question we would like to see answered is: is it a case of truth in advertising? Questionable testing procedures? Adequate Standards? (CSA is currently working on a new standard for fan testing).

Another question that must be asked is whether the industry is actually producing equipment to meet today's needs. Rather than just modifying existing equipment, manufacturers should reexamine the just what it is they are making, and what are the needs of today's housing. If they don't we will see a major invasion of European equipment where they take ventilation more seriously.

New Induced Draft Domestic Hot Water Heater

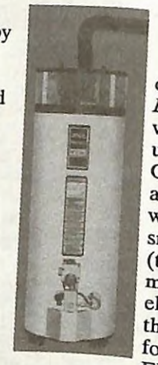
GSW, manufacturers of the John Wood water heaters, announced a new 50 US gallon power vented gas water heater. The vent is a high temperature plastic pipe (3" ID); 5' comes with the unit but it can take a maximum vent of 20' (plus 2 - 90° elbows).

The unit looks like their regular JW502 model with a power vented kit.

Manufacturer's reps quoted a premium of $150-200 for this model. This is a far cry from the $800-1200 extra charged for induced draft hot water heaters when they were introduced. Now there is less of an excuse not to use induced draft dhw tanks.

For information:
GSW Water Products Co.
599 Hill St. West
Fergus, Ont. N1M 2X1
Tel: (519) 843-1610
Fax: (519) 843-6121

(Another) New Induced Draft Domestic Hot Water Heater



Another new induced draft DHW heater is the *BWC-Jetglas Thru-the-Wall* vented gas heater. The unit has just received Canadian Gas Association approval for installations with up to 24 feet of smooth rigid metal vent (type C or better) plus a maximum of 2 - 90° elbows. The standard vent this unit comes with is a 6 foot high temperature EPDM duct.

Under normal operating conditions the unit exhausts 80 cfm through the vent when the heater is in operation. The manufacturer claims that even with a static pressure of 6" acting on the vent the unit will still operate properly, and will still exhaust 35 cfm.

The units will be stocked in Western Canada by Western Supplies Ltd.

Natural Formulas

We've discussed the importance of clean home environments for the chemically sensitive. Last issue we reviewed 2 books that deal with the topic of healthy homes and their construction.

Building low-tox houses not only makes it a healthier environment for the homeowner, but it also can make it easier on the builder. Oliver Drerup recounts the story of pouring a foundation using concrete with no additives (something hard to get) and finding it a pleasure to work with as there were no caustic chemicals.

But once the house is built, it has to be kept clean for hygienic and aesthetic concerns. We have been convinced over the years that we have to use the latest chemical compounds to keep the sink, tub or kitchen sparkling, brighter than bright, and it can only be done by using *Sudso* or whatever the product. Manufacturers create lots of these things for every imaginable use in the home. We've become so convinced that we rush out to buy these things and our storage cabinets resemble a chemists storehouse.

Anyone with a small toddler at home can appreciate the potential problem as they try to child-proof the home.

But is it necessary to use all that stuff? Do you realize that there are basic natural products that do a better job than the patented commercial products? For those that want to try these natural remedies, there now is an excellent reference book available. **The Natural Formula Book for Home & Garden**, edited by Dan Wallace not only gives you a range of formulas for making household products but also discusses the background of why they do their job.

The Natural Formula Book for Home and Yard, edited by Dan Wallace; published by Rodale Press; $ 24.95

Available from Solplan Review, please add $ .75 for postage & handling.

Overheard from Bert Phillips, P. Eng (Unies, Ltd., Winnipeg), at the EEBA conference, March 1989:

"ventilation effectiveness: You can kill a fly with a sledgehammer.
Ventilation effectiveness with efficency: You can kill a fly with a fly swater"

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CONFERENCE PROCEEDINGS

The 472 page Proceedings include all papers presented at the 15th Annual SESCI Conference in Penticton, June 1989. They are now available for $30.00. Papers include research and monitoring results on low energy houses, passive solar energy, heat pumps, windows, energy conservation, ventilation and indoor air quality issues.

To order your copy, or for more details, contact: SESCI,
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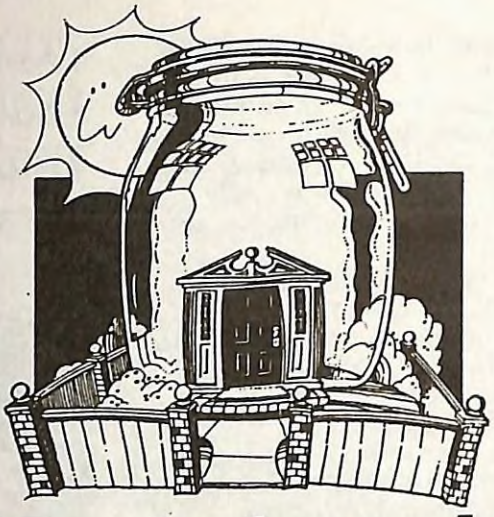

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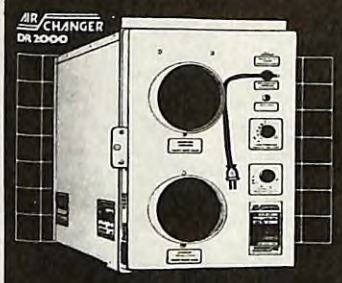

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